Water Chemistry Protocol **Bioassessment Surveys and Yosemite Project**

For each survey reach, record measurements of pH, temperature (°C), conductivity [µS (Siemens)] using an Oakton meter, and conduct titrations for dissolved oxygen and alkalinity using LaMotte kits.

Oakton meter (pH, temperature, conductivity)

Locate yourself at a convenient location and place the Oakton meter probe in the stream for 15 minutes to allow for equilibration to stable readings. Place the meter in a shaded area of the bank. Flag the site in case you leave the meter unattended and be careful that it does not get stepped on. During this time, run titrations for dissolved oxygen and alkalinity. After this time, record pH, temperature, and conductivity.

Alkalinity (LaMotte kit)

1. Rinse titration tube with stream water three times before taking 5ml sample.
2. Add one Phenolphthalein tablet. Cap and shake until tablet disintegrates. If solution does not turn red, P alkalinity is 0 (discard the sample, collect another, and proceed to steps 6 and 7b -most cases of low alkalinity). If solution turns red, proceed to step 3.
3. Fill the direct reading titrator syringe with Alkalinity Titration Reagent B (insert syringe in reagent bottle, turn upside down, draw-in sample and eject back into bottle to remove bubbles, then draw reagent into syringe to zero fill-line). Insert titrator syringe into center hole of cap in titation bottle.
4. While gently swirling tube, slowly press plunger to titrate until red color disappears. Read test result to the nearest mark where plunger tip lines up with titrator scale or it may be necessary to estimate between subdivisions as each line equals 4. Record as mg/l P Alkalinity as $CaCO_3$.
5. Being careful not to move plunger, remove titrator and titration tube cap from titration tube.
6. Add one BCG-MR tablet. Cap and shake until tablet disintegrates. Solution will turn green-blue.

7a. Reinsert titrator syringe in cap and continue titration until color changes from green-blue to pink. Read test result to the nearest mark where plunger tip lines up with titrator scale or it may be necessary to estimate between subdivisions as each line equals 4. Record as mg/l T Alkalinity as $CaCO_3$. Be sure to include in test result value the total amount of titration reagent dispensed (i.e., see step 5).

7b. Fill the direct reading titrator syringe with Alkalinity Titration Reagent B (insert syringe in reagent bottle, turn upside down, draw-in sample and eject back into bottle to remove bubbles, then draw reagent into syringe to zero fill-line). Insert titrator syringe into center hole of cap in titation bottle. Add titrant drop by drop (swirling with each drop) until green-blue color changes completely to pink. Read the titrant added from syringe at the tip of the syringe plunger.

Dissolved oxygen (LaMotte kit)

1. Rinse sample bottle three times with stream water before taking sample.
2. Submerge bottle, then remove cap. Tap sides of bottle to remove air bubbles and cap while submerged.
3. Add 8 drops of manganous sulfate solution. Add 8 drops of alkaline potassium iodide azide. Cap and mix. Allow precipitate to settle.
4. Use spoon to add 1g of sulfamic acid powder (tap in carefully). Cap and mix until reagent and precipitate dissolve. Sample is now fixed.
5. Rinse titration tube w/ small volume fixed sample, then fill titration tube to 20 ml line and cap.
6. Fill titrator with sodium thiosulfate (0.025N) adding one drop at a time to sample and swirl between each addition until color is very faint yellow.
7. Remove titrator and cap. Add 8 drops of starch indicator solution. Replace cap and titrator. Titrate sample until blue color disappears. Read titrator scale and record result as mg/l dissolved oxygen.

Turbidity

Collect an unfiltered sample of stream water from the center of the flow (below water surface but off the bottom) in a 60 ml HDPE bottle and record stream/site/date and turbidity on the label. Determine in lab using turbidimeter.

Water Sampling for Nutrient Analyses

- collect water samples for nutrient analysis from a location above the delineated reach (avoids sampling from the disturbed reach area)
- collect duplicate samples, each in a 175 ml HDPE bottle (acid cleaned and stored with DI)
- samples are filtered and acidified so that they may be stored (up to 30 d) prior to analysis

At the collection location:

1. Draw stream water into a 60 ml syringe and eject several times (rinses)
2. Collect sample in syringe and filter through a GF/F filter (in filter holder) into a 250 ml beaker (or other stream-rinsed container) – 3 syringe volumes required
3. Insert stream-rinsed Oakton pH probe into beaker and add a drop of concentrated sulfuric acid – stir and note pH – adjust in this way to a pH around 2.0 (no more than 2-3 drops required for adjustment of poorly buffered stream water in many Yosemite watersheds)
4. Pour the filtered-acidified water into the sample container
5. Label as stream/site/date nutirient #1, and repeat for duplicate nutrient sample (#2)